

[0033] FIG. 1 is a block diagram showing a display system having an electronic apparatus according to an exemplary embodiment.

[0034] The display system 100 according to an exemplary embodiment includes an electronic apparatus 110 and a display apparatus 150.

[0035] The electronic apparatus 110 according to an exemplary embodiment is an electronic device having an IR receiver 111 disposed as a first wireless receiver or a first wireless module therein and a WiFi module 130 disposed as a second wireless module therein. The IR receiver 111 receives an IR signal corresponding to a user's input as a first wireless signal from an external apparatus. The WiFi module 130 transmits and receives a WiFi signal as a second wireless signal via an access point (AP) such as a wired or wireless router. In particular, the electronic apparatus 110 may include an electronic apparatus having relatively small size in which that the IR receiver 111 and the WiFi module 130 is structurally and spatially disposed adjacent to each other.

[0036] Hereinafter, the electronic apparatus 110 is assumed and explained as, for example, a digital broadcast set-top box, which receives a broadcast signal and/or broadcasting information by wire or wireless through a broadcast receiver (not shown) and transmits the received broadcast signal and/or broadcasting information to the display apparatus 150. Also, since the broadcast receiver is not directly related with the exemplary embodiment, explanation thereon is omitted.

[0037] The display apparatus 150 receives and processes the broadcast signal and/or broadcasting information from the electronic apparatus 110 and outputs a video and/or an audio included in the broadcast signal and/or broadcasting information. The display apparatus 150 may include a television (TV), a monitor or the like to output the video and/or the audio. Hereinafter, the display apparatus 150 is assumed as being configured as a TV.

[0038] As shown in FIG. 1, the electronic apparatus 110 is a digital broadcast set-top box capable of preventing a problem in which an IR signal is distorted thus to result in an inoperable condition or malfunction thereof, due to an interference by the WiFi module 130 when receiving the IR signal from an external apparatus 140, such as remote controller, and include a IR receiver 111, a signal decoder 113, a signal analyzer 115, a storage 120, a WiFi module 130, and a controller 145.

[0039] The IR receiver 111 as an IR module receives a remote control signal of an IR frequency band, for example, KHz or 58 KHz, from the remote controller 140 and transmits the received remote control signal to the signal decoder 113. As shown in FIG. 2, the remote control signal may be a signal having a bit pulse form.

[0040] Referring to FIG. 2, the remote control signal transmitted by the remote controller 140 may be configured in a pulse format including a start bit pulse StartBit, a control byte pulse ControlByte and a data byte pulse DataByte.

[0041] The start bit pulse StartBit is a signal indicating that the remote controller 140 transmits the remote control signal to the electronic apparatus 110. The signal decoder 113 recognizes the start bit pulse StartBit and decodes the data byte pulse DataByte following the start bit pulse StartBit. The data byte pulse DataByte is a signal related to data corresponding to a digit or function key button 141 to be transmitted to the electronic apparatus 110 from the

remote controller 140. At the remote controller 140, the data is encoded in a pulse form via a signal encoder 143 to transmit via an IR transmitter 145 to the electronic apparatus 110. The control byte pulse ControlByte is a signal indicating a type, a length, a byte index, etc. of data to be transmitted.

[0042] If the user presses a certain digit or function key button 141 of the remote controller 140, the remote controller 140 transmits a pulse signal as shown in FIG. 2, as a remote control signal, to the electronic apparatus 110. The remote controller 140 first transmits a start bit pulse StartBit, and at certain intervals, a control byte pulse ControlByte and a data byte pulse DataByte corresponding to the certain key button 141. The electronic apparatus 110 decodes the transmitted pulse signal and processes a command corresponding thereto.

[0043] The signal decoder 113 decodes the pulse signal received from the IR receiver 111. For example, if receiving a certain pulse signal, the signal decoder 113 may analyze the received pulse signal to decode based on a pulse code modulation (PCM) method. A data signal corresponding to the certain digit or function key button 141 decoded in the PCM method is transmitted to the signal analyzer 115.

[0044] The signal analyzer 115 analyzes whether the received data signal has a format coinciding with a predetermined pulse format of the remote control signal to detect that the received data signal is in an abnormal state (FIG. 4) where it is distorted to have a noise created therein, as shown in FIG. 3. At the same time, the signal analyzer 115 matches the received data signal to a command from among commands stored in advance in the storage 120. The pulse format analysis result and the command matching result are transmitted along with the received data signal to the controller 145.

[0045] The storage 120 stores commands of the remote controller, a processing and controlling program for the controller 145, etc.

[0046] The storage 120 may be configured as at least one from among storage media comprising a flash memory, a hard disk, a multimedia card micro memory, a card type memory, such as a SD memory, a XD memory or the like, a random access memory (RAM), a static random access memory (SRAM), a read-only memory (ROM), an electrically erasable programmable read-only memory (EEPROM), a programmable read-only memory (PROM), a magnetic memory, a magnetic disc, and an optical disc.

[0047] The WiFi module 130, which is a wireless module to allow the user to do the internet by wireless at a place in which an access point (AP) such as a wired and/or wireless router is provided, transmits and receives a WiFi signal to and from the access point according to an input via the key button 141 of the remote controller 140 or an input via input means, such as a remote controller (not shown) of the display apparatus 150 or the like, under a control of the controller 145. The WiFi module 130 may transmit data in a transmission rate of about 54 Mbps by using a frequency band of 2.4 GHz.

[0048] The controller 145 controls a general operation of the electronic apparatus 110 according to the processing and controlling program for the controller 145 stored in the storage 120. The controller 145 may be configured as a central processing unit (CPU).

[0049] Also, the controller 145 performs a command according to the command matching result received from the